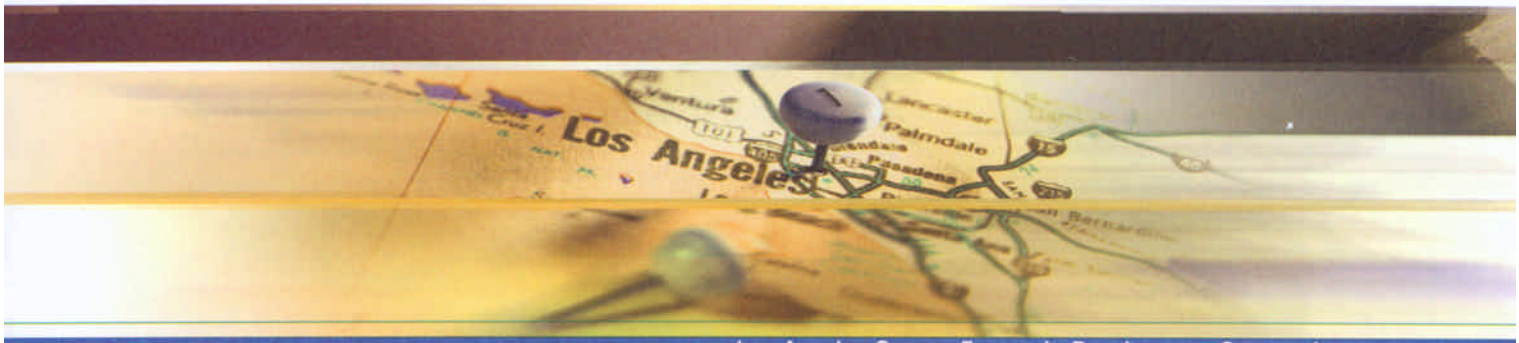
Los Angeles-Inland Empire Railroad Main Line Advanced Planning Study



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LAEDC
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FOR THE REGIONS OF LA COUNTY

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I. Introduction

The completion of the Alameda Corridor Project in April 2002 marks the first step in a desperately needed upgrade of Southern California's rail infrastructure. The region's growing population and role as the nation's import hub for burgeoning Pacific Rim trade is driving rapid growth in container traffic at the ports of Los Angeles and Long Beach. The increase in container traffic is in turn fueling a dramatic increase in rail traffic. Accommodating future rail traffic demand will require major grade separation and improvement projects east of the Alameda Corridor terminus near downtown Los Angeles.

Three rail lines form the Alameda Corridor East[1] connecting the northern end of the Alameda Corridor at Redondo Junction to the Colton Crossing in San Bernardino County. The Burlington Northern Santa Fe (BNSF) line runs through northern Orange County while the two Union Pacific (UP) lines – the Alhambra and LA – run through the San Gabriel Valley before intersecting with the BNSF line at Colton Crossing. (Maps of the study area can be found in Appendix A.) The Southern California Association of Governments (SCAG) commissioned this study to forecast future rail traffic along the Alameda Corridor East, and to assess the need for infrastructure improvements.

The study report consists of three main sections and a series of appendices. The first section presents forecasts for population and employment growth in the six-county (Los Angeles, Orange, Riverside, San Bernardino, Ventura and Imperial) Southern California region through 2025. It also covers container traffic at the Ports of Los Angeles and Long Beach, along with rail traffic through the Alameda Corridor East, during the same time period. The second section translates the growth forecasts into freight and passenger rail traffic. Summary results are presented from computer simulations of rail traffic patterns along the Alameda Corridor through 2025, together with rail infrastructure improvements needed to handle the expected load. The third section suggests possible strategies for funding the expensive rail and grade-crossing improvements.

The study concludes with a brief outline of the next steps required to prepare the region's rail infrastructure to handle the substantial increase in freight and passenger traffic expected over the next twenty-plus years.

[1] Somewhat confusingly, the name "Alameda Corridor East" can refer to the two UP lines running through the San Gabriel Valley *as well as* to the UP San Gabriel lines plus BNSF line through Orange County. (The BNSF alone is known as the Orange County Gateway.) This study uses the more inclusive definition of Alameda Corridor East to denote all three lines connecting the Alameda Corridor (at Redondo Junction) and the Colton Crossing.

II. Growth Forecasts

In July and August 2001, the LAEDC reviewed the literature on train traffic in the Southern California and the impact of international trade through the Port of Los Angeles and the Port of Long Beach. (A list of the literature can be found in Appendix B). From this starting point, the LAEDC prepared forecasts of the average number of trains expected per day on the Alameda Corridor East lines in 2010 and 2025.

The analysis required several steps, beginning with population (Table 1) and employment (Table 2) forecasts to gauge the size of the regional demand for imports. These estimates, together with international trade forecasts for California and the United States, were used in forecasting the container traffic at the Ports of Los Angeles and Long Beach (Table 3). The port container traffic formed the dominant component of the freight rail forecasts, which included separate growth rates for international intermodal, international non-intermodal, and domestic intermodal traffic (Table 4). Finally, the estimated number of trains on each line, including both passenger and freight traffic, was calculated for the BNSF and UP lines (Table 5).

Population Projections

Population growth in Southern California has important implications for future freight and people movement needs in the region. A larger population base will create a larger market, fueling demand for imports. The ports will thus handle greater imports of both finished consumer goods, and industrial materials used as inputs for local businesses. A larger population base will also translate into greater demand for Amtrak and Metrolink service.

The population projections used for this study are from the State of California Department of Finance. Table 1 shows the population projections, by county, for 2010 and 2025.

For the 6-County Southern California Area (Los Angeles, Orange, Riverside, San Bernardino, Ventura and Imperial) as a whole, the population is projected to increase to 19.4 million residents by 2010. This is an increase of 2.5 million over the 2000 base, a gain of 14.9%. By 2025, the region's population is projected to reach 23.4 million residents, 6.5 million more than the 2000 total.

The regional total masks some of the county-level variation. Table 1 reveals population growth rates, 2000-2025, ranging from 24.2% and 25.2% for Orange and Los Angeles Counties, respectively, to 37.8% for Ventura County, 97.6% for the combined Riverside-San Bernardino Counties, and 124.1% for Imperial County. These differences are explained by variations in the availability of land for homes, the affordability of housing, and the number of job opportunities, along with environmental policies and attitudes and the relative size of their respective population bases.

Table 1
Southern California Population Projections

	1990	2000	2010	2025
Los Angeles County	8,901,987	9,716, 000	10,605,200	12,164,590
10-Year Change	+18.7%	+9.1%	+9.2%	--
25-Year Change	--	--	--	+25.2%
Orange County	2,417,552	2,893,100	3,266,700	3,593,045
10-Year Change	+24.3%	+19.7%	+12.9%	--
25-Year Change	--	--	--	+24.2%
Riverside & San Bernardino Counties	2,631,319	3,320,000	4,391,300	6,227,513
10-Year Change	+67.4%	+26.2%	+32.3%	--
25-Year Change	--	--	--	+87.6%
Ventura County	670,274	765,300	877,400	1,054,603
10-Year Change	+25.9%	+14.2%	+14.6%	--
25-Year Change	--	--	--	+37.8%
Imperial County	110,100	154,549	221,585	346,354
10-Year Change	+19.5%	+40.4%	+43.4%	--
25-Year Change	--	--	--	+124.1%
Total	14,731,232	16,848,949	19,362,185	23,386,106
10-Year Change	+26.5%	+14.3%	+14.9%	--
25-Year Change	--	--	--	+38.8%

Sources: State of California, Department of Finance, "Race/Ethnic Population with Age and Sex Detail," 1970-2040, CA, December 1998; "Interim County Population Projections: California," June 2001. The 2000 and 2010 figures are from the June 2001 revised population estimates (which reflect the April 2000 Census). The 2025 figures are from the 1998 forecast, which was not revised in 2001, which creates a minor discontinuity in the statistical trend.

Employment Projections

The LAEDC developed employment projections for the region[2] in 2010 and 2025, presented in Table 2. The projected rise of 22.2% in the 2000-2010 period (which closely resembles the economy's performance during the 1980s) indicates the region's full recovery from the recession and restructuring of the early 1990s. A job total of 8.2 million is projected for 2010, representing an increase of 1.5 million workers in the region. The 2025 forecast projects employment of 10.4 million, an increase of 54.4% (3.7 million workers) over the 2000 base.

[2] Forecasts were not available for Imperial County, which has been omitted from Table 2.

This "upbeat" forecast of the region's economy is premised on an expansion of core industries, healthy and growing export markets especially in Asia and the Americas, a favorable business climate, available land for factories and warehouses, reliable energy supply at competitive prices, and an efficient transportation system. The Riverside-San Bernardino Area will see the fastest growth over the 25-year period, close to 100%, bringing the employment level to nearly 2 million workers by 2025. Ventura County's employment growth will be constrained by its self-imposed "growth limits," leading to more modest employment increase of 38.6% over the 25-year period that will take the county's job count to 380,000.

Congested Los Angeles County will see businesses and people attracted to the Antelope Valley where land is still available. As in Orange County, workers will tolerate long commutes from surrounding areas in search of attractive jobs. Employment in Los Angeles County is projected to reach 5.7 million in 2025, an increase of 38.3% over 2000, while Orange County will see growth of 73.0% to reach 2.4 million workers by 2025.

Table 2
Southern California Employment Projections
(000's)

	1990	2000	2010	2025
Los Angeles County	4,133.3	4,091.5	4,709.5	5,658.0
10-Year Change	+14.5%	-1.0%	+15.1%	--
25-Year Change	--	--	--	+38.3%
Orange County	1,172.4	1,390.8	1,820.7	2,406.0
10-Year Change	+40.2%	+18.6%	+30.9%	--
25-Year Change	--	--	--	+73.0%
Riverside & San Bernardino Counties	712.6	991.3	1,396.5	1,977.0
10-Year Change	+23.6%	+39.1%	+40.9%	--
25-Year Change	--	--	--	+99.4%
Ventura County	230.3	274.2	319.2	380.0
10-Year Change	+50.5%	+19.1%	+16.4%	--
25-Year Change	--	--	--	+38.6%
Total	6,248.6	6,747.8	8,245.9	10,421.0
10-Year Change	+23.9%	+8.0%	+22.2%	--
25-Year Change	--	--	--	+54.4%

Source: Employment Development Department, State of California, Sacramento, CA (2002). 2010 and 2025 Forecasts by Los Angeles Economic Development Corporation (August 2001).

These projections of economic expansion and job growth in Southern California are premised on assumptions that the regional economy will continue to successfully attract capital and businesses, resolve environmental conflicts, maintain a high tolerance by the workforce for long commutes, invest in the expansion of port, airport, rail and highway capacity, and adopt programs to train its workforce.

Trade Expansion/Containerized Cargo

Containerized cargo traffic through the San Pedro Ports was selected as the best indicator of international trade expansion and the closest fit with the region's future rail challenges. In 2000, 9.5 million TEU (Twenty Foot Equivalent Units) moved through the ports, of which 2.5 million were empties. Using methodology developed for the AB2928 study, total TEU are projected to increase by 80.5% over the 2000 volume, and amount to 17.12 million in 2010. As explained in Table 3, this forecast is close to the new Port of Long Beach/Port of Los Angeles forecast developed by the Meyer, Mohaddes Associates, Inc. team and published in June 2001. For 2025, however, our projection of 30.34 million TEU – an increase of 220% over 2000 – is lower than the lower than the 36.15 million TEU predicted in the above-cited study. If the actual container traffic in 2025 is higher than the 30.34 TEU assumed in this study, it will simply reinforce the findings presented in section three.

Table 3
Ports of Los Angeles and Long Beach
Containerized Cargo Traffic
(Millions of TEU)

	2000	2010	2025
Loaded	**6.98**	**12.60**	**22.34**
10-Year Change	--	+80.5%	--
25-Year Change	--	--	+220.0%
Total	**9.48**	**17.12***	**30.34****
10-Year Change	--	+80.5%	--
25-Year Change	--	--	+220.0%

Notes: * 2010 total TEU forecast is slightly higher than in the POLB/POLA Transportation Study (June 2001) – 16.72 million – by 2.4%.
** For the out-years to 2025, the POLB/POLA Study's total TEU forecast of 36.15 million – is 19.1% higher than shown here.

Sources:
(1) 2000 data from Port of Los Angeles and Port of Long Beach;
(2) 2020 forecast from AB2928 "Alameda Corridor-East Trade Corridor" study, April 2001;
(3) 2025 forecast extrapolates from 2020 forecasts in AB2928 study.

Cargo Growth Rates

Growth rates for cargo traffic and the associated freight train movements are summarized in Table 4.

Table 4
Cargo Forecast Summary:
Compound Annual Growth Rates

	2000-2010	2010-2025
International Intermodal	6.09%	3.89%
International Non-intermodal	1.50%	1.00%
Domestic Intermodal	2.50%	1.50%

International intermodal traffic will be the dominant component of freight rail growth in the period being studied. This will be the case whether we apply the June 2001 Ports of Los Angeles and Long Beach projection of 36.15 million TEU in 2025 or LAEDC's more conservative forecast of 30.34 TEU in 2025. For Year 2010, the Ports and LAEDC are in virtual agreement: 17.12 million (LAEDC) and 16.72 million (Ports) places the LAEDC forecast 2.4% above that of the Ports.

It is important to remember that annual growth rates in international trade tend to be quite volatile. A good example is the high growth rates experienced before the 1997 Asian Crisis, followed by lower rates in 1998-1999, a boom in 2000, then 2001 virtually flat, and the prospect that 2002 could be negative. In evaluating a 10-year and 25-year time horizon, longer-term averages are a better guide. The overall growth rate is forecast to be 6.09% for 2000-2010 and 3.89% for 2010-2025.

International non-intermodal (carload) traffic is expected to see very weak growth. Exports of coal from western Utah to Japan, for example, have lost out to Australian coal as a result of the cheaper Aussie currency. Most Japanese cars destined for America markets are now manufactured in the U.S, with only a small share arriving at the ports. Dry bulk, white bulk, oil, and steel slabs require a small number of trains and will not likely increase in sufficient volume to warrant more than minimal additions to the train count. The growth rate forecast for this segment is 1.5% for 2000-2010 and 1.0% for 2010-2025.

Domestic intermodal traffic should see growth rates that are less robust than its international counterpart, 2.5% for 2000-2010 and 1.5% for 2010-2025. This will be largely driven by the expected expansion of the Southern California economy over the long-term horizon and the need of businesses to be competitive in their "just-in-time" inventory practices.

2025 Train Traffic Forecast

The LAEDC began with the BNSF Year 2000 train count of peak-day, average and 90th percentile freight train movements through the study area. The UP was less forthcoming with data, though we did obtain UP average train counts on an unofficial basis. The UP daily averages were inflated by 20 percent to be comparable to the peak-day counts from BNSF. These base numbers, and the growth rates discussed above, were used to modify the train forecast from the AB2928 study conducted by the LAEDC in April of 2001. The Table 5 presents the 2025 *average* daily train forecast for the Alameda Corridor East. (Tables in the rest of the report will refer to *peak- day* counts.)

Table 5
2025 LA Inland Basin Train Forecast
(Average Daily Trains)

	2000	2010	2025
Freight	**112**	**165**	**250**
BNSF(*)	57	80	120
UP(**)	55	85	130
Passengers	**58**	**100**	**140**
BNSF(*)	46	75	100
UP(**)	12	25	40
Total – All Trains	**170**	**265**	**390**

Notes: * BNSF line moving east and south from downtown Los Angeles, intersecting with the I-710 and I-605, then moving through Orange and Riverside Counties.
** UPRR line paralleling the I-10 and SR-60, intersecting the I-15 in San Bernardino.

Sources: Orange County Gateway Study (November 1999); San Gabriel Valley Council of Governments Study; AB2928 Study (April 2001); Metrolink and Amtrak.

The LAEDC is comfortable with the freight figures in Table 5, but considers the Metrolink and Amtrak 2010 and 2025 service plan estimates to be "unrealistically high." Considerable investment in equipment, infrastructure and trackage would be required to reach these levels.

III. Modeling Future Rail Traffic

Leachman and Associates modeled train traffic, 2000-2025, on the Alameda Corridor East trade corridor rail network from the terminus of the Alameda Corridor at the downtown rail yards east to Colton Crossing. Leachman and Associates begin by breaking down the year 2000-train counts for each line by rail segment (complete track charts can be found in Appendix C), before applying the LAEDC-determined growth rates to each. The BNSF traffic data for year 2000, along with unconstrained forecasts for 2010 and 2025 are presented in Table 6. UP rail traffic for year 2000 only are laid out in Table 7, with 2010 and 2025 forecasts described in Tables 8 and 9. Leachman and Associates then recap the forecast and offer some national and historical context, before comparing the traffic forecast with current track capacity. Since current track capacity is simply inadequate for the expected rail traffic, four possible routing alternatives on the UP portion of the corridor are identified and modeled.

Table 6
BNSF Peak-Day Rail Traffic for 2000, 2010 & 2025
on the LA Inland Basin Rail Network (# of Trains)

	Hobart – Fullerton	Fullerton – Atwood	Atwood - Riverside	Riverside – Colton
Year 2000 Total	96	52	74	103
BNSF through freight	50	50	57	57
Passenger	46	2	17	11
UP through freight	--	--	--	35
Year 2010 Total	150	94	120	120
BNSF through freight	74	74	82	82
Passenger	76	20	38	24
UP through freight	--	--	--	14
Year 2025 Total	218	144	183	174
BNSF through freight	112	112	121	121
Passenger	106	32	62	36
UP through freight	--	--	--	17

As shown in Table 6, freight traffic is expected to more than double, 2000-2025. In addition, Metrolink and Amtrak's ambitious plans (particularly for trains connecting Riverside to Orange County) will see passenger train levels increase dramatically. Table 6 indicates that UP through freight moving on the BNSF line will decline, but only because it will be displaced by the increasing number of BNSF freight trains.

Table 7
UP Peak-Day Rail Traffic for 2000
on the LA Inland Basin Rail Network (# of Trains)

	East LA - Pomona	Pomona – Mira Loma	Mira Loma - Riverside	Riverside – Colton
UP LA Sub Line	43	43	47	103
UP through freight	31	31	35	35
Passenger	12	12	12	11
BNSF through freight	--	--	--	57
	East Bank Line	**LATC - Pomona**	**Pomona – West Colton**	**West Colton – Colton**
UP Alhambra Line	31	26	26	31
UP through freight	19	24	24	29
Passenger	12	2	2	2

Table 7 shows estimated peak-day traffic on various segments of the UP lines in 2000. UP has two rail lines traversing the Alameda Corridor East: the LA and Alhambra lines, the latter of which includes the East Bank Line. Since these lines cross at Pomona, there are four possible routes for trains moving from one end of the corridor to the other. This flexibility introduces a wide margin of uncertainty for forecasts for freight traffic along individual segments. Regardless of which routes the trains use, the total number of trains is going to increase.

Table 8
UP Peak-Day Rail Traffic for 2010
on the LA Inland Basin Rail Network (# of Trains)

	West of Pomona	East of Pomona	
UP LA Sub Line	?	?	
UP through freight	14	14	
Passenger	22	22	
	West of Pomona	**Pomona – West Colton**	**West Colton – Colton**
UP Alhambra Line	?	?	?
UP through freight	11	15	23
Passenger	4	4	4
Flexible Freight	57		
	Through Pomona	**Through Colton**	
Total UP Trains	104	115	
UP through freight	78	89	
Passenger	26	26	

Note: Figures in Table 8 refer to peak-train counts while numbers in Table 5 are average daily train counts.

Table 8 shows the forecast for peak-day UP rail traffic in 2010, highlighting the number of freight and passenger trains that must traverse each segment as well as the number of trains whose routing is flexible. The forecast includes 22 passenger trains on the LA Line and 4 passenger trains on the Alhambra Line. Some of the freight trains will have an inflexible routing (depending on where they originate), and their numbers are reflected in the train counts for the LA and Alhambra lines in Table 8. The 57 trains with flexible routing defy assignment to specific line segments, so the total peak day train counts on the UP portion of the corridor are given for the two locations where the UP lines meet: Pomona and Colton.

Table 9
UP Peak-Day Rail Traffic for 2025
on the LA Inland Basin Rail Network (# of Trains)

	West of Pomona	East of Pomona
UP LA Sub Line	?	?
UP through freight	14	14
Passenger	36	36

	West of Pomona	Pomona – West Colton	West Colton – Colton
UP Alhambra Line	?	?	?
UP through freight	13	17	27
Passenger	8	8	8

Flexible Freight	92

	Through Pomona	Through Colton
Total UP Trains	161	176
UP through freight	117	132
Passenger	44	44

As shown in Table 9, the number of "flexible" freight trains that may be routed along either the San Gabriel or Alhambra UP lines will reach 92 by 2025. The combined total of passenger trains along both lines on peak days will reach 44.

Recap

In 2010, the BNSF line will see 75 passenger trains and 80 freight trains daily. The two UP lines will split 25 passenger trains and 85 freight trains daily. This means that in less than 10 years, the Alameda Corridor East will have 5-6 tracks' worth of trains!

In 2025, the BNSF line will carry 100 passenger trains and 120 freight trains, while the UP lines will share 40 passenger trains and 130 freight trains. This is enough trains to fill 7 tracks to capacity, daily!

Even if the passenger rail plans from Amtrak and Metrolink prove wildly optimistic (which is not unlikely given the enormous capital investment required to reach these service levels), the freight train volume alone would be sufficient to require triple tracking the BNSF line from Colton Crossing all the way to Chicago.

The Big Picture

To find the appropriate precedent for these kinds of rail densities in the United States, one has to go all the way back to the four-track main lines of the Pennsylvania, New York Central, and Chicago-area railroads of the 1920s and 1940s. These railroad volumes gradually declined in the postwar period, owing first to the completion of the interstate highway network and later, to the shift in manufacturing from the Northeast to overseas facilities.

The expected surge in Southern California rail traffic reflects a tectonic shift in U.S. international commerce. Increasingly, U.S. companies have global supply chains, importing enormous volumes of inexpensive manufactured goods from across Asia, particularly China. The goods arrive on the west coast and are then distributed to the rest of the United States.

The flow of these goods will be concentrated in Southern California for three reasons. First, this region has the most capacity. The Ports of Los Angeles and Long Beach together form the largest container port complex in the United States, and are the third busiest container facility in the world. Together they handle one-third of all U.S. container traffic, and over 65 percent of all west coast container traffic. Second, Southern California is an enormous market. The 17 million residents of the five-country region are the final market for roughly 25 percent of all the imports coming through the ports. A further 15 to 35 percent of the cargo makes its first stop somewhere in the five-county region as part of a value-added process. ("Value-added" activities can range from placing an item being on a hanger and sorting for shipment elsewhere to using the item as a component in a manufacturing process.) The third reason is really a combination of the first two: poor logistics on the western side of the Pacific make Southern California the logical entry point for US-bound shipments. For containers with goods bound for multiple destinations across the U.S., it just makes sense to ship them first to the port(s) that serve the market that will absorb the greatest proportion of the goods (so that the smallest amount will have to be re-shipped).

These larger trends are driving the rise in freight rail traffic through the Alameda Corridor East. The railroads, however, are barely recovering their cost of capital nationwide, and lack the revenues, at current rates, for major capital improvements. For the community at large, the increase in freight rail traffic poses three challenges. First, adding more trains to the current infrastructure will increase delays at rail crossings for trucks and passenger vehicles. Second, vehicles idling while waiting for trains will increase air pollution. Third, if the rail network is insufficient to handle the expected volume of freight, the containers will be moved by truck. More trucks will increase pollution further and worsen congestion on our already overcrowded freeways.

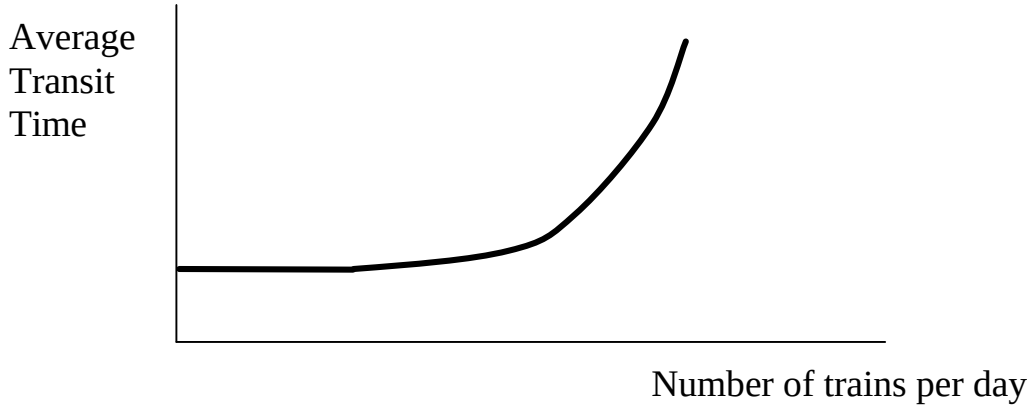
Capacity

BNSF has a single rail line running through the Alameda Corridor East from Redondo to Colton Crossing. For 46.4 miles of the route there are 2 main tracks; 16.6 miles have 3 main tracks; and 1.5 miles are covered by 4 main tracks. The UP LA line includes 4.2 miles of triple track (on a portion of the route shared with BNSF); 42.3 miles of double-tracked main line (3.1

miles with BNSF); and 12.4 miles of single track with sidings. The UP Alhambra line (including the East Bank Line) has 21.9 miles of double-tracked main line, and 38.6 miles of single track with siding.

With a maximum capacity of 50 trains per day per line, both BNSF and UP will have track capacity shortfalls on certain line segments by 2010, barring any major improvements. Figure 1 illustrates the increase in delay as the number of trains per day on a rail line increases. The trade-off is worse, i.e. transit times rise more sharply, when the line has a mix of trains (such as freight and passengers) that travel at different speeds.

Figure 1
Rail Line Capacity:
The Trade-Off Between Train Volume and Delay



Solutions

This study examines possible upgrades to the Alameda Corridor East rail lines to handle the rising freight volumes. The goal is to find the average delay per train in year 2000 and devise promising track capacity improvements that maintain year 2000 levels of delay in train dispatching simulations of 2010 and 2025 traffic levels.

Rail Simulations

The train-dispatching model uses a discrete-event simulation of 190 consecutive peak-days (which effectively "stress-tests" the improvements). Freight train departure times are randomized, and passenger train departure times are fixed. The model incorporates assumptions about train lengths, acceleration and deceleration rates, track configurations and speed limits. The model also incorporates traffic control logic to resolve conflicts. (Leachman and Associates' methodology notes and progress reports can be found in Appendix D.)

Assumptions

Devising rail line alternatives to test with the model was limited by practical considerations. BNSF, for example, has only one route and we only analyzed alternatives in which UP and BNSF trains would stay on their own tracks (and existing trackage rights). This assumption is reasonable, since many trains can't change railroad anyway because of the terminal, rail yard or intermodal facility they are using (Table 10).

Table 10
Routing Flexibility of Freight Rail Traffic
on the LA Inland Basin Rail Network (# of Trains)

	Inflexible Routing	Flexible Routing
Year 2010	74	96
Year 2025	88	162

We further assumed that there would be no changes in existing rail freight terminals, other than the routing of international intermodal traffic through the Alameda Corridor (which had not yet opened when the model was run). We assumed that there would be no changes in the existing main-line interchange points for carload freight traffic, and crucially, we assumed that Metrolink will not run reverse-direction rush-hour service on the UP LA and BNSF lines. Rush-hour passenger train traffic will basically close one track to freight. Running in the reverse direction would require dedicating a second line to passengers, which would completely disrupt freight operations. Non-rush-hour reverse-direction passenger rail service would not have the same impact because the lower off-peak passenger volumes need not completely displace freight traffic.

Simulation Results

Table 11 shows the average delay per freight train in minutes for BNSF and UP freight trains moving through the Alameda Corridor East in 2000 and 2010.

Table 11
Freight Train Delay on the LA Inland Basin Rail Network
in 2000 and 2010:
Existing Tracks with No Improvements

	Average Delay Per Train (minutes)	
	Year 2000 Baseline	**2010 Freight / 2000 Passenger**
BNSF Freight	31.9	206.3
UP Freight	30.4	196.9

Note: "Average Delay" accounts for both delays and running time differences.

When the model was run with passenger trains at the level anticipated by the Metrolink and Amtrak service plans, the entire rail system froze. The region's rail system is inadequate for forecast train traffic. *Even with the rail passenger traffic constrained at year 2000 levels*, the simulations reveal that the forecast freight train traffic in 2010 will increase delay more than six-fold to over three hours. This represents the *average* delay per freight train, implying that some freight trains are waiting between four and six hours.

Thus, without additional tracks and other improvements, the forecast freight and passenger train levels will result in a total breakdown of the rail network through the Alameda Corridor East by 2010. And the average delay per train will rise substantially long before 2010 levels are reached. Further simulations reveal that just 25 percent of the forecast 2010 traffic is sufficient to roughly double the average delay per train, to 67.6 minutes for BNSF freight and 54.4 minutes for UP freight. At 30 percent of forecast 2010 levels, the average BNSF freight train is delayed 91.4 minutes; the average UP freight train waits 81.4 minutes.

Routing Alternatives

The inflexibility of part of the UP freight, combined with BNSF's single route through the Alameda Corridor East, limits the study alternatives to the flexible freight on the UP Alhambra and LA Lines. Designing one route to carry most of the UP trains would require fewer grade separations, thus offering potential cost savings. Since the UP routes share the right-of-way through Pomona and Ontario, there are four possible freight alternatives that assign most of the flexible UP freight to only one route. (Diagrams of the routing alternatives can be found in Appendix E.)

Alternatives 3 and 4, however, are impractical. The UP shares track with BNSF between Riverside and Colton (on the San Gabriel Line). In 2025, alternatives 3 and 4 would add 105 UP trains to 121 BNSF and 36 passenger trains between Riverside and Colton. The shared portion of the line (actually owned by BNSF) will be effectively blocked to UP by the sheer number of BNSF trains. Running 262 trains on one line is just not practical, so Alternatives 3 and 4 were discarded.

Further distinctions can be made based on the routing of passenger trains. Alternative 1a and Alternative 2 maintain the status quo for passenger rail, with Metrolink Riverside trains using the LA Line. In Alternatives 1b, Metrolink Riverside trains are re-routed via the Alhamba Line west of Pomona.

In summary, four routing alternatives were tested. The **Status Quo Alternative** (based on existing split of UP freight roughly two-thirds via the LA Line, and one-third via the Alhambra Line, with Metrolink Riverside trains using the LA Line.) **Alternative 1a** puts most of the UP freight trains on the LA Line west of Pomona and the Alhambra Line east of Pomona. As noted above, Metrolink Riverside trains use the LA Line. **Alternative 1b** is exactly the same as 1a, except that Metrolink Riverside trains are re-routed via the Alhamba Line west of Pomona. **Alternative 2** routes most UP freight trains via the Alhambra Line, and leaves the Metrolink Riverside trains on the LA Line.

Table 12 shows the average delay per freight train moving through the Alameda Corridor East for each of the four routing alternatives, given year 2000, 2010 and 2025 freight and passenger levels. Note that the 2010 and 2025 forecasts *assume the improvements and additional tracks described in Table 13 are built*.

Table 12
Freight Train Delay on the LA Inland Basin Rail Network in 2010 and 2025:
With Recommended Additional Tracks and Improvements

	Average Delay Per Train (minutes)		
Routing Option	**Year 2000 Baseline***	**2010 Freight & Passengers**	**2025 Freight & Passengers**
Status Quo			
BNSF Freight	31.9	26.1	30.6
UP Freight	30.4	27.0	23.7
Alternatives 1a, 1b and 2			
BNSF Freight	--	26.7	28.7
UP Freight, Alt. 1a	--	23.7	14.7
UP Freight, Alt. 1b	--	15.2	12.3
UP Freight, Alt. 2	--	25.6	25.2

Note: * Existing tracks.

Complete results from the train simulations can be found in Appendix &&. Table 12 reveals that Alternative 1b (most of the UP freight trains on the San Gabriel Line west of Pomona and the Alhambra Line east of Pomona; Metrolink Riverside trains re-routed via the Alhamba Line west of Pomona) does an astonishing job, even managing to *lower* the average delay for UP freight trains despite the overall rise in train traffic. The real story, however, is the ability of all of the routing alternatives to cope with the extraordinary train levels expected in 2010 and 2025 while maintaining roughly the same level of delay present in the system in 2000. Doing so will require the capacity improvements described in Table 13.

Required Capacity Improvements

To limit delay in 2010 and 2025 to the numbers reported in Table 12 would require the following improvements:

Table 13
Required Capacity Improvements
on the LA Inland Basin Rail Network for each Routing Alternative

	2010	2025
Status Quo		
BNSF	?? 3 main tracks, Hobart–Fullerton ?? 3 main tracks, Atwood–Colton	?? 4 main tracks, Hobart–Fullerton ?? 4 main tracks, Atwood–Colton ?? 3 main tracks, Atwood–Riverside ?? Flying Junction at Riverside ?? Grade separation of Colton Crossing
UP	?? 2 main tracks, Pomona–Riverside ?? 2 main tracks, Pomona–Colton	?? 2 main tracks, East LA–Pomona ?? 2 main tracks, LATC–Pomona ?? Flying Junction of Palmdale Line at West Colton ?? Flying Junction at Riverside ?? Grade separation of Colton Crossing
BNSF Alternatives 1a, 1b, 2		
	?? 3 main tracks, Hobart–Fullerton ?? 3 main tracks, Atwood–Colton	?? 4 main tracks, Hobart–Fullerton ?? 3 main tracks, Atwood–Colton ?? Grade separation of Colton Crossing
UP Alternative 1a		
	?? 2 main tracks, East LA–Pomona ?? 2 main tracks, Pomona–Colton	?? 3 main tracks, East LA–Pomona ?? Flying junction at Pomona ?? Flying junction of Palmdale Line at West Colton ?? Grade separation of Colton Crossing
UP Alternative 1b		
	?? 2 main tracks, East LA–Pomona ?? 2 main tracks, Pomona–Colton	?? 2 main tracks, LATC–Pomona ?? Flying junction at Pomona ?? Flying junction of Palmdale Line at West Colton ?? Grade separation of Colton Crossing
UP Alternative 2		
	?? 2 main tracks, Pasadena Junction – Colton	?? 3 main tracks on the East Bank Line ?? Flying junction at Pomona ?? Metrolink fly-over at Pasadena Junction (LATC) ?? Flying junction of Palmdale Line at West Colton ?? Grade separation of Colton Crossing

Note: These improvements are limited to the rail infrastructure required to physically handle the train. The Status Quo Alternative would require more track capacity improvements and

more road-rail grade separations than Alternatives 1a, 1b or 2. Alternatives 1a and 1b have the added benefit of opening up the Alhambra Line for more Metrolink service. Alternatives 1b and 2 would give UP a dedicated freight line, and Alternative 2 would open up the San Gabriel Line for additional Metrolink service. (Diagrams of the flying junctions can be found in Appendix E.)

Table 14 shows the number of trains expected on the UP San Gabriel and Alhambra Lines under Alternatives 1a, 1b and 2.

Table 14
UP Rail Traffic Between LA and Pomona, 2025,
on the LA Inland Basin Rail Network (# of Trains)

	LA Sub Line		Alhambra Line	
Alternative 1a	**East LA - Pomona**	**Pomona – Riverside**	**LATC - Pomona**	**Pomona – Colton**
Freight	104	17	13	105
Passenger	36	36	8	8
Alternative 1b	**East LA - Pomona**	**Pomona – Riverside**	**LATC - Pomona**	**Pomona – Colton**
Freight	104	17	13	105
Passenger	0	36	44	8
Alternative 2	**East LA - Pomona**	**Pomona – Riverside**	**LATC - Pomona**	**Pomona – Colton**
Freight	17	17	99	105
Passenger	36	36	8	8

With more than one hundred trains per day anticipated on some of the line segments, mitigation will be extremely important. Ensuring local traffic patterns and surrounding communities are not adversely affected will require numerous grade separations and other mitigation efforts.

IV. Funding Strategies

The three rail lines that form the Alameda Corridor East urgently need additional track, grade-separated rail/road crossings and other improvements to handle the anticipated surge in freight and passenger rail traffic, 2000-2025. Planning and building these improvements will cost at least $4.5 billion, assuming most of the freight traffic on the UP lines is concentrated on a single route. Maintaining the status quo routing – with UP freight split between the Alhambra and San Gabriel Lines, necessitating full grade-separation of both lines – would cost $6.5 billion. (A preliminary survey of required improvements and grade separations along with their projected costs was conducted by Parsons Brinckerhoff, Inc., and can be found in Appendix G.) At two to three times the cost of the Alameda Corridor, upgrading the Southern California rail system from the Redondo Junction to the Colton Crossing will be a daunting challenge.

The obvious model for developing the Alameda Corridor East is its namesake, the Alameda Corridor, which offers instructive precedents in regional coordination and funding. The Alameda Corridor used a joint powers agreement to surmount the difficulties imposed by overlapping (and occasionally conflicting) jurisdictions and interests. The Alameda Corridor East faces an even more elaborate balancing act among stakeholders including various state and regional transportation agencies (such as Caltrans, OCTA, MTA, RCTC, SANBAG, and SCAG), previous established joint powers authorities (ACE and OnTrac), numerous cities and unincorporated portions of four counties along the route, and the railroads themselves. In lieu of a joint powers authority, regional coordination could also be based on the joint venture program for the ACE Trade Corridor Plan developed by ACE, OnTrac, RCTC and SANBAG under the requirements of Assembly Bill 2928.

Financing for the $2.4 billion Alameda Corridor was cobbled together from myriad sources, a feat the Alameda Corridor East will have to replicate. Table 15 lists the Alameda Corridor funding sources.

Table 15
Alameda Corridor Financing

Source	**$ (Millions)**
Port Contributions	394
Federal DOT Loan	400
MTA Grants	347
Bond Proceeds	1,160
Other	124
Total	**2,425**

The port contributions in Table 15 were made to expedite the project development and $234 Million is reimbursable from Bond Proceeds. A significant portion of the project was also financed by a $400 Million federal loan from the Department of Transportation. Most of the

money from MTA (roughly 76 percent) was "pass through" federal and state funding; the other 24 percent came from L.A. County Proposition C sales tax revenue. The DOT loan and various bond issues will be repaid over the next 35 years using local user fees and container charges. Other sources of funding included miscellaneous state and federal grants, reimbursements from the railroads and projected investment earnings. Perhaps the most salient point for the Alameda Corridor East is the proportion of the total project cost – 74 percent or $1.8 billion – that will be repaid with user fees and container charges.

This section surveys the potential federal, state, local and private sector funding opportunities for the Alameda Corridor East, briefly evaluates the funding environment, and then suggests a creative funding alternative.

Federal Funding Sources

The Federal Government is most important single source of funding for mainline rail and highway related transportation system improvements. This funding typically takes the form of matching grants and loans or loan guarantees. The most significant funding mechanism is the Transportation Equity Act for the 21st Century (TEA-21) which expires in 2003 and is currently up for renewal. Following is a brief discussion of the principal federal sources for which the Alameda Corridor East project may be eligible.

FHWA Congestion Mitigation and Air Quality (CMAQ) Improvement Program: CMAQ is an 80/20 matching grant program within TEA-21. If funds are used for the interstate highway system it is a 90/10 match ratio. Funds are released to each state based on population and the severity of air quality programs. States then work with Metropolitan Planning Organizations (MPO) to determine which projects receive funding in the State Implementation Plan (STIP). Eligibility includes Title 23 (Chapter 53, U.S. Code) Highway projects, rail infrastructure improvements to benefit air quality and public-private initiatives with significant public benefit. CMAQ appears to be the most flexible source of federal funding available for rail infrastructure and grade crossing improvements. CMAQ funds were used in conjunction with local air district funding at the Blythe, California Intermodal yard. A rail-truck transfer facility was built with the funds for loading containers on to rail cars thereby reducing regional truck traffic into Southern California seaports.

Surface Transportation Program (STP): STP is an 80/20 matching grant program within TEA-21. These funds are distributed to the states and are available for roadway improvements on Federal-aid Highways including the National Highway System (NHS). Highway improvements to accommodate the movement of rail freight through intermodal access are eligible for STP, but have a lower priority. STP funds were used in Port Hueneme, California to purchase several partially abandoned rail lines with plans to expand one for freight use from the port. These funds were also used by the Port of Anchorage to eliminate five rail crossings along a single corridor that connects the City of Anchorage to the port.

STP Section 130 (Sec.130): Sec. 130 (Title 23) is an 80/20 matching grant program under TEA-21. These funds are a 10% set-aside from the STP above. The Rail-Highway Crossings

Program provides federal money to states to reduce accidents at railroad crossings. These grants may be used to install or improve crossing safety devices such as signs, signals and gates. The Ohio Rail Development Commission provided an overmatch to its Section 130 $6.2 million allocation in 1999 to more than double the budget to $15 million for safety-related improvements at grade crossings in that State.

National Highway Systems (NHS): NHS is an 80/20 matching grant program under TEA-21 with a 90/10 ratio for interstate projects, applicable to the federal highway system for construction, rehabilitation and safety improvements. NHS connections to intermodal freight facilities are included in this type of funding.

National Corridor Planning and Development Program (Section 1118): National Corridors is an 80/20 matching grant program under TEA-21. This program established competitive funding packages to support planning studies and infrastructure development along major freight corridors. Funds are eligible for Title 23 purposes including feasibility studies, corridor planning and design, multi-state and intrastate coordination of corridors, environmental review and construction. All projects applying for these funds must be included in their respective STIP. However, the programs are funded over and above the regular formula allocations to the States. Another attractive feature is the national scope of the programs rather than state or local, which is a good fit with the national significance of the Alameda Corridor East.

Demonstration Projects/High Priority Projects (HPP): These funds are earmarked in TEA-21 for 80/20 matching grants. As such, the projects bypass coordinated state and federal planning processes. Highway, rail and intermodal projects are eligible for this type of funding. The expansion of the main Southern California rail lines to accommodate greater freight and passenger rail use, and the importance of avoiding further truck drayage to and from the ports in a very congested, non-attainment air basin, suggest a strong case for Alameda Corridor East eligibility.

Transportation and Community and System Preservation Pilot (TCSP): Highway and transit system planning grants with an 80/20 ratio (TEA-21). States, local governments, and MPO's are eligible for funds to investigate the relationships between transportation, community and system preservation, and private sector-based initiatives.

State Infrastructure Bank (SIB): TEA-21 authorized four states, including California to capitalize SIB programs with federal-aid funding from the U.S. DOT. Funding sources include the NHS and STP. Loans and credit enhancements require a 20% local match from the sponsoring agency. Highway and transit capital projects are eligible for SIB assistance.

Transportation Infrastructure Finance and Innovation Act of 1998 (TIFIA): This entails loan guarantees, with lines of credit for projects over $100 million (TEA-21). Funding includes highway, passenger-rail and intermodal projects. Highway projects include any type of program that is eligible for federal and highway assistance under Title 23 of the U.S. Code. Rail projects include design and construction of inter-city passenger rail facilities. Publicly owned intermodal facilities and grade crossing improvements on or adjacent to the NHS are also eligible. Additional criteria under TEA-21 include (1) inclusion in a State Transportation

Improvement Plan (STIP); (2) project costs exceeding $100 million or 50% of federal highway assistance to the state; and (3) project financing must be repayable from dedicated revenue sources.

Though it pre-dates TIFIA, the most prominent federal loan program thus far remains the funding of the Alameda Corridor. A $400 million U.S. DOT loan was secured from the Federal Rail Administration (FRA) and packaged with a combination of federal, state, local and private sector funding (described in Table 15). The loan repayment is funded by revenue generated by port surcharges and rail corridor use.

Railroad Rehabilitation and Improvement Financing Program (RRIF): Provides direct loans and loan guarantees under Sec 7203 of TEA-21 for railroads, governments and other entities. This funding may be used to acquire or improve rail equipment and facilities, including intermodal.

Grant Anticipation Revenue Vehicle (GARVEE): A financing instrument budgeted into TEA-21 with bond issuance at 80/20 ratio based on future federal appropriations. GARVEE Bonds are restricted to Title 23 Highway uses, and carry Treasury Bill rates. GARVEE Bonds have two options: (1) direct, in which federal funds directly reimburse debt service; and (2) indirect, where federal funds offset State expenditures on other federal-aid projects.

Table 16
Federal Funding Sources

Program	Type	Potential Use
CMAQ	Grant	Infrastructure projects, Grade crossings where emissions reductions can be demonstrated
STP	Grant	Infrastructure, Grade Crossings on Federal-Aid Highways
Sec 130	Grant	Grade Crossing Safety Measures
Sec 1118	Grant	Planning Studies Highway Improvements
NHS	Grant	Intermodal Access, Grade Crossings Related to Federal Highways
HPP	Grant	All project elements: Highway, Rail, Intermodal
TCSP	Grant	Planning Study Funds
SIB	Loan	Highway Related Loans
TIFIA	Loan	Rail Infrastructure Highway Related
RRIF	Loan	Infrastructure Improvements for Rail
GARVEE	Loan	Highway Related

State Funding Sources

The State of California is an important source of grants and loans, particularly state-allocated federal funds channeled through the STIP program. Other state sources of funding have been limited in recent years and there are a number of challenges with respect to the rail-related financing. The swelling population in Southern California, particularly the Inland Empire, will place enormous demands on transportation funds. Highway congestion will reach unprecedented proportions and the Inland Empire faces a serious degradation in air quality. To make matters worse, revenue from fuel taxes are expected to decrease as vehicle fuel efficiency increases and alternative fuel vehicle programs expand. Also, maintenance costs of existing transportation facilities will continue to increase due to heavy use and deterioration of existing roadways. Therefore, it will be essential to demonstrate air quality benefits or reduced highway congestion for state participation in new rail infrastructure or grade crossing investments in Southern California.

Potential state funding sources include:

State Transportation Improvement Program (STIP): Federal Grants and loans from TEA-21 are allocated to the states based on Regional Transportation Plans (RTPs) adopted by MPO's and a STIP adopted by the State legislature. All revenues are allocated on a programming basis related to specific project costs. The Alameda Corridor East Trade Corridor was included in the 2001 RTP as an action item, but no specific projects were identified.

Traffic Congestion Relief Plan (TCRP): State legislation signed by Governor Davis in 2000 which committed approximately $7 billion in new statewide transportation funding spread over five years (FY 2003-2007). Annual distributions are made to the counties. Incorporated into the appropriation was $273 million for grade separations on the existing Alameda Corridor East Trade Corridor. Proposition 42 was approved on the March 5, 2002 ballot as the Transportation Congestion Improvement Act. This Act places all provisions of the TCRP legislation in the State Constitution. In addition, it requires that all gasoline sales tax revenue will continue to be used for state and local transportation purposes from 2008 forward. (Gasoline sale tax revenues were allocated exclusively to transportation in the TCRP, but only through 2008.) These revenues will be split between public transportation (20%), projects funded in the STIP (40%), and local streets and roads (20% each to cities and counties).

State Transit Assistance (STA): Revenues are derived from a portion of the gasoline excise tax plus sales tax on diesel fuel sales. Levels of STA funding are established by the legislature on an annual basis. Future fuel revenues are expected to flatten or even decline, making this a problematic funding source.

California Infrastructure and Economic Development Bank (CIB): The CIB was established in 1994 to facilitate development of infrastructure and public improvements to assist economic development throughout the State. Over a 20-year period, the program will be able to fund approximately $250 Million in projects. There is broad authority to issue bonds, make loans and loan guarantees, and leverage other government funds for economic

development. Applicants are limited to public agencies and non-profit corporations. Eligible projects include highways, city streets, public safety facilities and public transit projects. The CIB uses a pre-application process to qualify projects, followed by a more detailed application for selected projects.

Tax Exempt Debt: A Missouri statute permits the formation of transportation corporations for the purpose of tax-exempt financing. BNSF and UP Railroads used the statute to form a corporation to construct a major rail bridge fly-over to separate east-west and north-south rail traffic. The corporation was able to issue bonds for construction and also access tax-exempt status from property tax. The bonds were repaid from user fees and had interest rates similar to those available with a federal line of credit. Adopting a similar program in California would require new legislation.

Local Funding Sources

Local sources will contribute more than two-thirds of the SCAG 2001 Regional Transportation Plan, though highway and transit improvements will capture a most of this revenue. Local revenue is thus unlikely to be a significant source of mainline rail infrastructure improvements. The massive increase in freight and passenger rail demand, however, will create substantial need for grade crossing improvements. Local jurisdictions may wish to join with the railroads and state and federal agencies to mitigate the vehicular traffic, grade safety problems and environmental issues posed by the volume of rail traffic along the Alameda Corridor East.

Potential local funding sources include:

Transportation Development Act (TDA): TDA funds are generated from a ¼ percent share of State Sales Tax revenue. These funds are returned to the county of tax generation. According to the findings of the 2001 RTP, these revenues should grow considerably in Southern California due to predicted large population increases. Annual growth rates will vary by county with a low range of 3 to 4 percent to a high range of 8.5 to 9 percent. The Inland Empire will see a significant growth in these revenues.

Local Sales Taxes: The largest current source of surface transportation revenues is derived from sales taxes. Los Angeles County has a permanent one percent sales tax for transportation. Other Southern California counties have a ¼ percent tax and they sunset in various years from 2009 to 2011. Similar to the TDA, this revenue will grow with the projected significant increases in population. All of these funds are earmarked for identified highway, rail or transit projects. The availability of funding beyond the sunset dates is entirely dependent upon future ballot initiatives, which require the support of a two-thirds majority of voters to pass.

South Coast Air Quality Management District (District): A major expansion of the Los Angeles-Inland Empire Trade Corridor will have significant impact on future air quality in the South Coast Air Basin. Significant increases in daily freight and passenger trains will add diesel emissions and multiply the vehicular emissions at grade crossings. Additions of new intermodal facilities to reduce truck traffic in the region will offset this somewhat but probably

only in a marginal way. The District, in conjunction with the California Air Resources Board (CARB) and U. S. EPA, may be persuaded to allocate a share of federal and state fuel taxes for assistance with the financing of grade crossing improvements and local rail facilities which reduce truck traffic.

Ports of Los Angeles and Long Beach: The ports are dependent on Southern California's rail network and highway system to distribute the containers arriving at their docks. Recognition of this dependence led to the use of port surcharges to help build the Alameda Corridor. The ports, however, are undertaking enormous capital improvement projects of their own, and may balk at further attempts to tap their revenues.

Metropolitan Transit Authority (MTA): In a similar vein to the ports, significant impacts on the mainline system will be created by expansion of the Metrolink program. As a county transportation commission and transit agency, MTA can assist in securing grants and financing loans for required tracking and grade crossings. Fare revenues could provide at least one source of grant matching funds or loan repayments, though operating cost requirements may severely limit this source.

Public-Private Funding Sources

Class I Railroads such as Burlington Northern Santa Fe (BNSF) and Union Pacific (UP) have limited capacity to construct selected infrastructure additions such as mainline track and intermodal facilities, primarily through debt financing from cash generated by operations. The railroads are not responsible for rail/road crossing conflicts, however, beyond a legal requirement to cover 5 percent of the cost of highway grade separation projects. They have expressed little interest in funding grade crossing improvements where there is no tangible increase in train throughput, and even if they were willing, the railroads would be unable to afford the number of grade separations anticipated for the Alameda Corridor East.

The most likely public-private scenario is some type of financial package combining private interests and various government entities at the federal, state and local level. An excellent way to leverage all funding sources would be some type of joint development program, possibly including one or more of the following:

Agency Leases: One type of joint arrangement is a lease agreement where a public entity enters into a lease agreement with a private organization that operates the facility. The facility is then owned by the jointly created agency, which in turn uses a portion of the operating revenue to secure the bond financing. Under this type of lease, the overall project financing can be acquired at a preferred interest rate over private financing. However, an element of risk for the capital investment is assumed by the public entity.

Cost-Sharing Programs: This approach can be used when both the public and private entities recognize sufficient mutual benefit for a capital investment. These types of arrangements allow for sharing of the investment risk and reduce the amount of capital investment from public

revenue. This type of financing should be applicable to mainline track investment, which is shared by the freight and passenger railroads and Metrolink.

Assessment

Funding the Alameda Corridor East will be challenging. The additional track, grade crossing separations and other improvements will require massive funding commitments. Yet the same population, economic and trade trends that make the Alameda Corridor East improvements so urgent are creating pressing transportation infrastructure needs elsewhere in the region, state and nation. The lengthening delays on interstate routes and highway arterials, for example, will create greater pressure for federal and state-funded improvements to the region's freeways. These projects will be seeking to tap pools of money insufficient to finance them all, particularly in light of the budgetary woes of the most likely funding sources.

Federal sources will undoubtedly play a critical role in any Alameda Corridor East funding strategy, underpinned by TEA-21 reauthorization. Federal funding for goods movement projects has traditionally received a lower priority than highway and transit projects, making TEA-21 reauthorization the best opportunity to influence federal rail funding. TEA-21 expires in fiscal 2003, but negotiations for the next five-year round of funding (tentatively dubbed "T3") are already underway. Since T3 will commit federal highway trust funds through 2008, it is critical that Alameda Corridor East be included. Yet numerous projects from around the country are competing vigorously for the same funds. Negotiations will conclude in January 2003, with the introduction of the Bush Administration budget bill. Given the difficultly of attracting federal funding for freight rail projects, failure to acquire T3 support may severely compromise the Alameda Corridor East project.

The project should focus on the CMAQ, NHS and National Corridor sections of TEA-21 reauthorization. CMAQ in particular should be a top priority due to the non-attainment status of the Los Angeles Basin and the heavy environmental impacts of goods movement. Similarly, the National Highway System (NHS) will be heavily impacted by future goods movement and require considerable investment if it is to absorb future traffic growth. The Corridor should be positioned as means of diverting freight from trucks to rail, relieving the already congested freeway system. The national significance of the Corridor – owing to the rest of the country's heavy dependence on the Ports of Los Angeles and Long Beach – should also be emphasized in seeking National Corridors funding. The Alameda Corridor East has a strong case for significant allocations from all three of these sources, but securing the funding will require coordinated lobbying and Congressional education efforts.

Several other categories of federal grant contributions are also worthy of pursuit. Section 130 funds (an STP set-aside) can be applied to grade crossings, which collectively form one of the most expensive components of rail corridor improvement. Components of the Alameda Corridor East improvement could be bundled as separate projects and apply for earmarked funding from High Priority Projects (HPP) funds. Finally, local government organizations should seek out planning grants under the TCSP program to help pay for the next steps recommended in the final section of this study.

In terms of federal loans, several categories in the upcoming TEA-21 reauthorization should be considered. For projects over $100 Million there is the TIFIA program. Direct loans and loan guarantees for railroads and other entities are available under RRIF. Grant anticipation (GARVEE) bonds can be issued based on future appropriations of federal grants. And the State of California is authorized to create State Infrastructure Bank (SIB) financing through the U.S. DOT using NHS and/or STP funding.

A final federal source that should be explored is the National Environmental Policy Act (NEPA), particularly as it relates to air quality degradation. Air quality in the region has yet to reach compliance with federal standards. A growing population will raise the number of vehicle trips (both for personal transportation and for the businesses that supply their needs). The increased freight movement into and through the region will add even more truck trips. Maintaining existing air quality levels (to say nothing of improving them) will thus be a tremendous challenge. The Alameda Corridor East will help air quality by reducing the number of additional truck trips required to disperse freight and allowing increased use of commuter rail instead of single occupancy vehicles. Grade separations will eliminate entirely pollution from cars and trucks idling at crossings while waiting for passing trains. The Alameda Corridor East should aggressive pursue any and all available funding and credit programs pertaining to air quality.

At the *state level*, there are two important sources – federal pass through funds (STIP) and the state TCRP program – along with a third, less promising source (the State Infrastructure Bank).

First and foremost are the federal grants and loans, which pass from the federal government through the State to local jurisdictions (described above). Accessing these funds for the Alameda Corridor East, however, will require the project's inclusion in STIP and its regional counterparts, the Southern California Association of Governments RTP and the Regional Transportation Improvement Plan (RTIP). In the 2001 Regional Transportation Plan Update, SCAG estimated that it will require $110.5 billion through 2025 to operate and maintain the existing transportation system, and fund presently committed STIP Projects through 2006. The Alameda Corridor East was designated as an item for study in the RTP, but obviously no specific projects are identified for the next STIP in 2004. In other words, the Alameda Corridor East has not yet been funded, and the region's infrastructure needs already exceed its ability to pay. Considerable work must be accomplished to place the critical elements of the Alameda Corridor East project in the RTIP and STIP for financing consideration, specifically federal support.

The second most important state source is the TCRP program, described above. The ballot proposition that made the program permanent allows the legislature to modify distribution of TCRP revenue (from sales tax on gasoline). The original bill allocated $273 million to grade crossings along the Alameda Corridor East, though this and future funding for rail improvements along the corridor will be at the discretion of the State legislature. Note, however, that revenue generated by state fuel taxes has been declining relative to vehicle miles traveled as cars have become more efficient.

A third potential state source of rail improvement financing is the California Infrastructure Bank (CIB), which has broad authority to issue bonds, loans and loan guarantees to leverage other government funds. Although established in 1994, the CIB remained unfunded until almost seven years later and its viability as a funding source for this project has yet to be determined. A final state source, the California Public Utilities Commission, funds mainline grade crossing safety improvements, but the funding available is miniscule relative to the amount needed for the Alameda Corridor East.

The *local level* represents the most uncertain funding source for the Alameda Corridor East. A one-quarter-percentage point share of the state sales tax generates TDA funds, but these are either already earmarked, or are up for renewal at the ballot box where they face long odds. The Riverside County initiative will be presented to the voters in November 2002; San Bernardino County voters will have their say in 2003. Even if these measures pass, the revenues tend to be assigned principally for highway and transit improvements. Local jurisdictions will need to be persuaded to direct some of the funds to grade separation projects to mitigate the primary local impact of increased train traffic, delay at rail/road crossings.

Other local funding will likely come from the MTA (in terms of the pass-through grants described above). The ports, however, are unlikely to support any additional funding support for off-dock rail projects, particularly now that they are faced with large capital improvement projects of their own. The railroads are compelled by law to provide 5 percent of the cost of highway grade separation projects. Any further contributions are likely to be directed to investments in rights of way and track improvements (which by themselves will place a substantial drain on the railroads' balance sheets). Emulating the Alameda Corridor and charging a fee to support revenue bonds is similarly constrained by the unwillingness of shippers and the railroads to pay yet another charge on goods using the Ports of Los Angeles and Long Beach.

Creative Financing

The Alameda Corridor East project will be very expensive, and must compete for funding with numerous urgently needed infrastructure projects in an era of budget shortfalls. The traditional neglect of freight transportation funding places the project a step behind in the scramble for funding even before it has begun. Many of the most likely non-governmental sources – such as the ports, terminal operators, shippers, and the railroads – are either committed to other projects or simply do not have the resources for such a massive project.

With revenue bond financing largely precluded by its use for the Alameda Corridor, the Alameda Corridor East is in need an innovative alternative. One possible solution is U.S. Customs revenue.

U.S. Customs revenues are collected on imports (not exports) and thus highly dependent on the nation's ports. The Ports of Los Angeles and Long Beach, in particular, handle one-third of all container traffic in the United States, and generate and even greater share of total customs revenue. The scale of growth anticipated in container traffic at the Ports of Los Angeles and

Long Beach thus has the potential to substantially boost U.S. Customs revenues. This additional customs revenue, however, will not materialize if the inland transportation network, particularly the mainline rail system, cannot handle the growth.

Accordingly, we propose that an increment of the growth in customs revenue be dedicated to a national trade infrastructure development trust fund. With such an enormous share of customs revenue dependent on the efficient movement of trade through the Los Angeles region, a significant portion of the customs revenue should naturally be directed to the Alameda Corridor East improvements. This federal contribution would help deflect local opposition to the concentrated costs – in terms of heavy truck traffic, congestion, air pollution and delays at rail crossings – generated by trade that benefits the entire nation. And since the investment in the Alameda Corridor East will facilitate a much greater flow of international trade through the ports, it will generate still more incremental customs revenues for use in trade infrastructure projects elsewhere.

V. Next Steps

While there is much work to be done on the project, several critical (and time-sensitive) steps need to be taken as soon as possible to ensure the eventual success of the Alameda Corridor East. These include, but are not limited to:

Aggressively pursuing inclusion in TEA-21 reauthorization;

Seeking inclusion in the 2004 RTP and subsequent STIP;

Costing out the routing alternatives proposed in this study;

Assessing the engineering feasibility and environmental impacts of the various routing alternatives;

Comparing the cost-benefit trade-offs of the different routing alternatives;

Studying the feasibility of incremental customs revenue financing.